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5 November 1996

AGREEMENT

CONCERNING THE ADOPTION OF UNIFORM TECHNICAL PRESCRIPTIONS FOR WHEELED VEHICLES, EQUIPMENT AND PARTS WHICH CAN BE FITTED AND/OR BE USED ON WHEELED VEHICLES AND THE CONDITIONS FOR RECIPROCAL RECOGNITION OF APPROVALS GRANTED ON THE BASIS OF THESE PRESCRIPTIONS */

(Revision 2, including the amendments entered into force on 16 October 1995)

Addendum 84: Regulation No. 85

Amendment 1

Supplement 1 to the original version of the Regulation - Date of entry into force: 9 July 1996

UNIFORM PROVISIONS CONCERNING THE APPROVAL OF INTERNAL COMBUSTION ENGINES INTENDED FOR THE PROPULSION OF MOTOR VEHICLES OF CATEGORIES M AND N WITH REGARD TO THE MEASUREMENT OF THE NET POWER

UNITED NATIONS

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*/ Former title of the Agreement:

Agreement Concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, done at Geneva on 20 March 1958.

GE.96-24585

The title of the Regulation, amend to read:

"UNIFORM PROVISIONS CONCERNING THE APPROVAL OF INTERNAL COMBUSTION ENGINES OR ELECTRIC DRIVE TRAINS INTENDED FOR THE PROPULSION OF MOTOR VEHICLES OF CATEGORIES M AND N WITH REGARD TO THE MEASUREMENT OF NET POWER AND THE MAXIMUM 30 MINUTES POWER OF ELECTRIC DRIVE TRAINS"

The list of contents, amend to read:

"REGULATION

.....

8. Modification and extension of approval of the drive train type
9. Production definitely discontinued
10. Names and addresses of technical services responsible for conducting tests, and of administrative departments

* * *

ANNEXES

Annex 1 - Essential characteristics of the internal combustion engine and information concerning the conduct of tests

Annex 2 - Essential characteristics of the electric drive train and information concerning the conduct of tests

Annex 3 - Communication concerning the approval or extension or refusal or withdrawal of approval or production definitely discontinued of a drive train type pursuant to Regulation No. 85

Annex 4 - Arrangements of approval marks

Annex 5 - Method for measuring internal combustion engine net power

Annex 6 - Method for measuring net power and the maximum 30 minutes power of electric drive trains

Annex 7 - Checks on conformity of production"

Paragraph 1, amend to read:

"1. SCOPE

1.1. This Regulation applies to the representation of the curve as a function of engine or motor speed of the power at full load indicated by the manufacturer for internal combustion engines or electric drive trains and the maximum 30 minutes power of electric drive trains intended for the propulsion of motor vehicles of categories M and N.

1.2. The internal combustion engines belong to one of the following categories:

Reciprocating piston engines (positive-ignition or compression-ignition), but excluding free piston engines;

Rotary piston engines (positive-ignition or compression-ignition).

1.3. The electric drive trains are composed of controllers and motors and are used for propulsion of vehicles as the sole mode of propulsion."

Paragraph 2, amend to read:

"2. DEFINITIONS

2.1. "Approval of a drive train" means the approval of a drive train type with regard to its net power measured in accordance with the procedure specified in annexes 5 or 6 to this Regulation;

2.2. "Drive train type" means a category of an internal combustion engine or an electric drive train for installation in a motor vehicle which does not differ in such essential characteristics as those defined in annexes 1 or 2 to this Regulation;

2.3. "Net power" means the power obtained on a test bench at the end of the crankshaft or its equivalent at the corresponding engine or motor speed with the auxiliaries listed in table 1 of annex 5 or in annex 6 to this Regulation, and determined under reference atmospheric conditions."

Insert a new paragraph 2.4., to read:

2.4. "Maximum 30 minutes power" means the maximum net power of an electric drive train at DC voltage as defined in 5.3.1., which a drive train can deliver over a period of 30 minutes as an average."

Paragraphs 3.1. to 3.3., amend to read:

"3.1. The application for approval of a drive train type with regard to the measurement of the net power and the maximum 30 minutes power of electric drive trains shall be submitted by the drive train manufacturer, the vehicle manufacturer, or by his duly accredited representative.

3.2. It shall be accompanied by the following documents in triplicate: description of the drive train comprising all the relevant particulars referred to in annexes 1 or 2 to this Regulation.

3.3. A drive train, representative of the drive train type to be approved, shall, with the equipment prescribed in annexes 5 or 6

to this Regulation, be submitted to the technical service conducting the approval tests."

Paragraphs 4.1. to 4.4., amend to read:

"4.1. If the power of the drive train submitted for approval pursuant to this Regulation has been measured according to the specifications of paragraph 5 below, approval of the drive train type shall be granted.

4.2. An approval number shall be assigned to each drive train type approved. Its first two digits [(at present 00 for the Regulation in its original form)] shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign the same number to another drive train type.

4.3. Notice of approval or of extension or of refusal of approval of a drive train type pursuant to this Regulation shall be communicated to the Parties to the 1958 Agreement applying this Regulation by means of a form conforming to the model in annex 3 to this Regulation.

4.4. There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every drive train conforming to a drive train type approved under this Regulation an international approval mark consisting of:"

Paragraph 4.4.3., amend to read:

"4.4.3. Alternatively, instead of affixing these approval marks and symbols to the drive train, the manufacturer may decide that each drive train type approved under this Regulation shall be accompanied by a document giving this information so that the approval marks and symbol can be attached to the vehicle."

Paragraph 4.5., amend to read:

"4.5. If the drive train conforms to a type approved, under one or more other Regulations annexed to the Agreement, in the country which has granted approval under this Regulation, the symbol prescribed in paragraph 4.4.1. need not be repeated; in such a case, the Regulation and approval numbers of all the Regulations under which approval has been granted in the country which has granted approval under this Regulation shall be placed in vertical columns to the right of the symbol prescribed in paragraph 4.4.1."

Paragraphs 4.7. and 4.8., amend to read:

"4.7. The approval mark shall be placed close to the drive train identification figures provided by the manufacturer.

4.8. Annex 4 to this Regulation gives examples of the arrangements of the approval mark."

Paragraph 5.1., amend to read:

"5.1. General

The components liable to affect the power of the drive train shall be so designed, constructed and assembled as to enable the drive train in normal use, despite the vibration to which it may be subjected, to comply with the provisions of this Regulation."

Paragraphs 5.2. and 5.2.1., amend to read:

"5.2. Description of tests for internal combustion engines

5.2.1. The net power test shall consist of a run at full throttle for positive-ignition engines and at fixed full-load fuel injection pump setting for diesel engines, the engine being equipped as specified in table 1 of annex 5 to this Regulation."

Paragraphs 5.2.4. and 5.2.5., amend to read:

"5.2.4. Measurements shall be carried out according to the provisions of annex 5 to this Regulation.

5.2.5. The test report shall contain the results and all the calculations required to find the net power, as listed in the appendix to annex 5 to this Regulation together with the characteristics of the engine listed in annex 1 to this Regulation."

Insert a new paragraph 5.3., to read:

"5.3. Description of tests for measuring the net power and the maximum 30 minutes power of electric drive trains

The electric drive train shall be equipped as specified in annex 6 to this Regulation. The electric drive train shall be supplied from a DC voltage source with a maximum voltage drop of 5 per cent depending on time and current (periods of less than 10 seconds excluded). The supply voltage of the test shall be given by the vehicle manufacturer.

Note:

If the battery limits the maximum 30 minutes power, the maximum 30 minutes power of an electric vehicle can be less than the maximum 30 minutes power of the drive train of the vehicle according to this test.

5.3.1. Determination of the net power

5.3.1.1. The motor and its entire equipment assembly must be conditioned at a temperature of 25°C ± 5°C for a minimum of two hours.

5.3.1.2. The net power test shall consist of a run at full setting of the power controller.

5.3.1.3. Just before beginning the test, the motor shall be run on the bench for three minutes delivering a power equal to 80 per cent of the maximum power at the speed recommended by the manufacturer.

5.3.1.4. Measurements shall be taken at a sufficient number of motor speeds to define correctly the power curve between zero and the highest motor speed recommended by the manufacturer. The whole test shall be completed within 5 minutes.

5.3.2. Determination of the maximum 30 minutes power

5.3.2.1. The motor and its entire equipment assembly must be conditioned at a temperature of 25°C ± 5°C for a minimum of four hours.

5.3.2.2. The electric drive train shall run at the bench at a power which is the best estimate of the manufacturer for the maximum 30 minutes power.
The speed must be in a speed range, which the net power is greater than 90 per cent of the maximum power as measured in paragraph 5.3.1. This speed shall be recommended by the manufacturer.

5.3.2.3. Speed and power shall be recorded. The power must be in a range of ± 5 per cent of the power value at the start of the test. The maximum 30 minutes power is the average of the power within the 30 minutes period."

Paragraph 5.3. (former), renumber as paragraph 5.4. and amend to read:

"5.4. Interpretation of results

The net power and the maximum 30 minutes power for electric drive trains indicated by the manufacturer for the type of drive train shall be accepted if it does not differ by more than ± 2 per cent for maximum power and more than ± 4 per cent at the other measurement points on the curve with a tolerance of ± 1.5 per cent for engine or motor speed, from the values measured by the technical service on the drive train submitted for testing."

Paragraph 6.1., amend to read:

"6.1. Every drive train bearing an approval mark as required by this Regulation shall conform to the approved drive train type."

Paragraphs 6.3.5. and 6.3.6., amend to read:

"6.3.5. Make sure that for each drive train type tests are carried out in accordance with the procedures approved by the competent authority.

6.3.6. Make sure that any collection of samples demonstrating non-conformity with the test type under consideration is followed by a subsequent collection and a further test (see annexes 5 and 6). All necessary steps shall be taken to re-establish due conformity of production."

Paragraph 7, amend to read:

"7. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

7.1. The approval granted in respect of a drive train type pursuant to this Regulation may be withdrawn if the requirements set forth above are not met or if a drive train bearing the approval mark does not conform to the type approved.

7.2. If a Contracting Party to the 1958 Agreement applying this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation, by means of a communication form conforming to the model in annex 3 to this Regulation."

Paragraphs 8 and 8.1., amend to read:

"8. MODIFICATION AND EXTENSION OF APPROVAL OF DRIVE TRAIN TYPE

8.1. Every modification of a drive train within a drive train type with regard to the characteristics in annexes 1 or 2, shall be notified to the administrative department which approved the drive train type. The department may then either:"

Paragraph 8.3., amend to read:

"8.3. The competent authority issuing the extension of approval shall assign a series number for such an extension and inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in annex 3 to this Regulation."

Paragraph 9, amend to read:

"9. PRODUCTION DEFINITELY DISCONTINUED

If the holder of an approval completely ceases to manufacture a drive train approved in accordance with this Regulation, he shall so inform the authority which granted the approval. Upon receiving the relevant communication that authority shall inform thereof the other Parties to the 1958 Agreement applying this

Regulation by means of a communication form conforming to the model in annex 3 to this Regulation."

Annex 1, the title, amend to read:

"Annex 1

ESSENTIAL CHARACTERISTICS OF THE INTERNAL COMBUSTION ENGINE AND INFORMATION CONCERNING THE CONDUCT OF TESTS 1/"

Insert a new annex 2, to read:

"Annex 2

ESSENTIAL CHARACTERISTICS OF THE ELECTRIC DRIVE TRAIN AND INFORMATION CONCERNING THE CONDUCT OF TESTS

1. General

1.1. Make . . . . . .

1.2. Type . . . . . .

1.3. Drive 3/: Monomotor/multimotors/(number) . . . . . .

1.4. Transmission arrangement: parallel/transaxial/others, to precise: . . . . . .

1.5. Test voltage: V

1.6. Basic motor rotation: . . . . . min^{-1}

1.7. Motor crankshaft maximum speed: . . . . . min^{-1}
(or by default): .... reducer/gearbox outlet shaft */ . . . min^{-1}
*/: gear engaged.

1.8. Maximum power speed 2/ (specified by the manufacturer) . . min^{-1}

1.9. Maximum power (specified by the manufacturer) . . . . . kW

1.10. Maximum 30 minutes power (specified by the manufacturer) . . . . . kW

1.11. Flexible range (where P $\geq$ 90 per cent of max. power):
speed at beginning of the range . . . . . min^{-1}
speed at the end of the range . . . . . min^{-1}

2. Motor

2.1. Working principle

2.1.1. Direct current (DC)/alternative current (AC) 3/ number of phases: . . . . . .

2.1.2. Excitation/separate/series/compound 3/ . . . . . .

2.1.3. Synchron/asynchron 3/ . . . . . .

2.1.4. Rotor coiled/with permanent magnets/with housing 3/

2.1.5. Number of poles of the motor: . . . . . .

2.2. Inertia mass: . . . . . .

3. Power controller

3.1. Make: . . . . . .

3.2. Type: . . . . . .

3.3. Control principle: vectorial/open loop/closed/other, to be specified: . . . . . .

3.4. Maximum effective current supplied to the motor: 2/ . . . . . A during . . . . . seconds

3.5. Voltage range use: . . . . . V to V

4. Cooling system:

Motor : liquid/air 3/
Controller : liquid/air 3/

4.1. Liquid-cooling equipment characteristics

4.1.1. Nature of the liquid ..... circulating pumps: yes/no 3/

4.1.2. Characteristics or make(s) and type(s) of the pump: . . . . . .

4.1.3. Thermostat: setting . . . . . .

4.1.4. Radiator: drawing(s) or make(s) and type(s) . . . . . .

4.1.5. Relief valve: pressure setting . . . . . .

4.1.6. Fan: characteristics or make(s) and type(s) . . . . . .

4.1.7. Fan duct: . . . . . .

4.2. Air-cooling equipment characteristics

4.2.1. Blower: characteristics or make(s) and type(s) . . . . . .

4.2.2. Standard air ducting: . . . . . .

4.2.3. Temperature regulating system: yes/no 3/

4.2.4. Brief description: . . . . . .

4.2.5. Air filter . . . . . make(s) . . . . . type(s) . . . . . .

4.3. Temperatures admitted by the manufacturer

4.3.1. Motor outlet: (max.) . . . . . °C

4.3.2. Controller inlet: (max) . . . . . °C

4.3.3. At motor reference point(s): (max.) . . . . . °C

4.3.4. At controller reference point(s): (max.) . . . . . °C

5. Insulating category: . . . . . .

6. International protection (IP)-code: . . . . . .

7. Lubrication system principle: 3/ Bearings: friction/ball
Lubricant: Grease/Oil
Seal: Yes/No
Circulation: with/without

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Annex 2 (former), renumber as annex 3, and amend to read:

"Annex 3

COMMUNICATION

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.....
PRODUCTION DEFINITELY DISCONTINUED

of a drive train pursuant to Regulation No. 85.

Approval No.:..... Extension No.:.....

1. Trade name or mark of drive train: . . . . . .

2. Drive train type: . . . . . .
.....

5. Drive train submitted for approval on: . . . . . .
.....

11. Internal combustion engine

11.1. Declared figures

11.1.1. Maximum net power: . . . . . kw, at . . . . . min^{-1}

11.1.2. Maximum net torque: . . . . . Nm, at . . . . . min^{-1}

11.2. Essential characteristics of the engine type:
.....
.
.
.

12. Electric drive train:

12.1. Declared figures

12.1.1. Maximum net power: . . . . . kW, at . . . . . min^{-1}

12.1.2. Maximum net torque: . . . . . Nm, at . . . . . min^{-1}

12.1.3. Maximum net torque at zero speed: . . . . . Nm

12.1.4. Maximum 30 minutes power: . . . . . kW

12.2. Essential characteristics of the electric drive train

12.2.1. Test DC voltage: V

12.2.2. Working principle: . . . . . .

12.2.3. Cooling system:

Motor: liquid/air 2/
Variator: liquid/air 2/

13. Approval granted/extended/refused/withdrawn 2/
....."

Annex 3 (former), renumber as annex 4, and amend to read:

"Annex 4

ARRANGEMENTS OF APPROVAL MARKS

.....
The above approval mark affixed to a drive train shows that the drive train type concerned has been approved in the Netherlands (E 4) with regard to the measurement of the net power, pursuant to Regulation No. 85 and under the approval number 002492. The approval number indicates that the approval was granted in accordance with the requirements of Regulation No. 85 in its original form.
....."

Annex 4 (former), renumber as annex 5.

Annex 4 - Appendix (former), renumber as "Annex 5 - Appendix".

Insert a new annex 6, to read:

"Annex 6

METHOD FOR MEASURING NET POWER AND THE MAXIMUM 30 MINUTES POWER OF ELECTRIC DRIVE TRAINS

1. These requirements apply for measuring the maximum net power and the maximum 30 minutes power of electric drive trains used for propelling pure electric road vehicles.

2. TEST CONDITIONS

2.1. The drive train shall have been run-in according to the manufacturer's recommendations.

2.2. If the power measurement can be carried out only on a drive train with the gear-box or a reducer mounted, the efficiency shall be taken into account.

2.3. AUXILIARIES

2.3.1. Auxiliaries to be fitted

During the test, the auxiliaries necessary for the drive train operation in the intended application (as listed in table 1 of this annex) shall be installed in the same position as in the vehicle.

2.3.2. Auxiliaries to be removed

The auxiliaries necessary for the proper operation of the vehicle, and which may be mounted on the motor shall be removed when performing the test. The following non-exhaustive list is given as an example:

Air compressor for brakes;
Power steering compressor;
Suspension system compressor;
Air conditioner system, etc.

Where accessories cannot be removed, the power they absorb in the unloaded condition may be determined and added to the measured power.

Table 1

AUXILIARIES TO BE FITTED FOR THE TEST TO DETERMINE NET POWER AND THE MAXIMUM 30 MINUTES POWER OF ELECTRIC DRIVE TRAINS

("Standard-production equipment" means equipment provided by the manufacturer for a particular application).

No.	AUXILIARIES	FITTED FOR NET POWER AND THE MAXIMUM 30 MINUTES POWER TEST
1	Stabilized DC power supply	Voltage drop during test less than 5 %
2	Speed variator and control device	Yes: Standard-production equipment
3	LIQUID-COOLING Motor bonnet) Bonnet outlet)	No
	Radiator 1/ 2/) Fan) Fan cowl) Pump) Thermostat 3/)	Yes: Standard-production equipment
	AIR COOLING Air filter) Cowl) Blower) Temperature adjustment system)	Yes: Standard-production equipment
4	Electric equipment	Yes: Standard-production equipment
5	Bench test auxiliary fan	Yes, if necessary

1/ The radiator, the fan, the fan cowl, the water pump and the thermostat shall be located on the test bench in the same relative position as on the vehicle. The cooling-liquid circulation shall be activated by the drive train water pump only.

Cooling of the liquid may be produced either by the drive train radiator, or by an external circuit, provided that the pressure loss of this circuit and the pressure at the pump inlet remain substantially the same as those of the drive train cooling system. The radiator shutter, if any, shall be in the open position.

Where the fan, radiator and fan cowl cannot conveniently be fitted for the bench test, the power absorbed by the fan when separately mounted in its correct position in relation to the radiator and cowl (if used), shall be determined at the speed corresponding to the motor speeds used for measurement of the motor power either by

calculation from standard characteristics or by practical tests. This power, corrected to the standard atmospheric conditions should be deducted from the correct power.

2/ Where a disconnectable or progressive fan or blower is incorporated, the test should be carried out with the disconnectable fan (or blower) disconnected or at maximum slip condition.

3/ The thermostat may be fixed in the fully open position.

2.4. SETTING CONDITIONS

The setting conditions shall conform to the manufacturer's specifications for the production motor and be used without further alteration for the particular application.

2.5. DATA TO BE RECORDED

2.5.1. The test for determining the net power shall be carried out with the accelerator control set at the maximum position.

2.5.2. The motor must have been run-in in accordance with the recommendations of the applicant for the approval.

2.5.3. Torque and speed data shall be recorded simultaneously.

2.5.4. If needed, the cooling liquid temperature recorded at the motor outlet must be maintained at ± 5 K of the thermostat temperature setting specified by the manufacturer.

For air cooling drive trains, the temperature at a point indicated by the manufacturer shall be kept within + 0/- 20 K of the maximum value specified by the manufacturer.

2.5.5. The temperature of the lubricating oil measured in the oil sump or at the outlet from the oil temperature exchanger (if any) shall be maintained within the limits prescribed by the manufacturer.

2.5.6. An auxiliary regulating system may be used, if necessary, to maintain the temperature within the limits specified in paragraphs 2.5.5. and 2.5.6.

3. ACCURACY OF MEASUREMENTS

3.1. Torque: ± 1 per cent of measured torque.

The torque measuring system shall be calibrated to take friction losses into account. The accuracy in the lower half of the measuring range of the dynamometer bench may be ± 2 per cent of measured torque.

3.2. Engine speed: 0.5 per cent of measured speed.

3.3. Motor inlet air temperature: ± 2K.

"

Annex 5 (former), renumber as annex 7 and amend as follows:

Paragraphs 1 to 3, amend to read:

"1. GENERAL

These requirements are consistent with tests to be held to check conformity of production, according to paragraph 6.3.6.

2. TEST PROCEDURES

The methods of testing and measuring instruments shall be those described in annexes 5 or 6 to this Regulation.

3. COLLECTION OF SAMPLES

One drive train has to be chosen. If after the test of paragraph 5.1. below, the drive train is not considered as conforming to the requirements of this Regulation, two more drive trains have to be tested."

Paragraph 4, amend to read:

"4. MEASUREMENT CRITERIA

4.1. Net power of internal combustion engine

During the tests to verify conformity of production, the power shall be measured at two engine speeds S1 and S2, corresponding respectively to the measurement points of maximum power and maximum torque accepted for type approval. At these two engine speeds, which are subject to a tolerance of ± 5 per cent, the net power measured at at least one point within the ranges S1 ± 5 per cent and S2 ± 5 per cent shall not differ by more than ± 5 per cent from the approval figure.

4.2. Net power and maximum 30 minutes power of electric drive trains

During the tests to verify conformity of production the power shall be measured at motor speed S1 corresponding to the measurement point of maximum power accepted for type approval. At this speed, the net power shall not differ by more than ± 5 per cent from the approval figure."

Paragraph 5, amend to read:

"5. EVALUATION OF RESULTS

5.1. If the net power and the maximum 30 minutes power of the drive train tested pursuant to paragraph 2 above fulfils the requirement of paragraph 4 above, the production is considered to conform to the type approval.

5.2. If the requirements of paragraph 4 above are not fulfilled, two more drive trains are tested in the same way.

5.3. If the net power figure or the maximum 30 minutes power of the second and/or third drive train of paragraph 5.2. does not fulfil the requirements of paragraph 4 above, the production shall be considered not to conform to the requirements of this Regulation and the provisions of paragraph 7.1. shall be put into effect."